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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,854	09/09/2003	Kenneth M. Martin	IMM050B	2113

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PATENT DEPARTMENT (51851)
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EXAMINER

PIZIALI, JEFFREY J

ART UNIT	PAPER NUMBER
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2629

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/657,854

Applicant(s)

MARTIN ET AL.

Examiner

Jeff Piziali

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed (on 21 December 2006) in this application after final rejection (mailed 29 September 2006). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 21 December 2006 has been entered.

Information Disclosure Statement

2. The listing of references in the specification (see, for instance, Paragraphs 30, 35, and 63 in the Specification) is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicants' cooperation is requested in correcting any errors of which applicants may become aware in the specification.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-3, 5-10, and 12-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Delson et al (US 6,002,184 A).

Regarding claim 1, Delson discloses a method comprising: receiving a sensor signal [Fig. 42; output signal from sensor 4206 to adaptive controller 4202 at a first/initial time] comprising a raw sensor value [i.e. measurement of the mechanism output at a first/initial time] from a sensor [Fig. 42; 4206], the raw sensor value associated with a position of a manipulandum [Fig. 42; 4208] in a range of motion; determining an adjusted raw sensor value [i.e. measurement of the mechanism output at a later time, following signal correction due to a discrepancy between the desired and measured mechanism output] based at least in part on the raw sensor value [wherein sensor feedback is used for the adaptive component of control] and a compliance between the sensor and the manipulandum; and outputting an output signal [Fig. 42; output signal from sensor 4206 to adaptive controller 4202 at a later time, following signal correction due to a discrepancy between the desired and measured mechanism output] comprising the adjusted raw sensor value (see Column 43, Line 62 - Column 44, Line 17).

Regarding claim 2, Delson discloses the compliance is associated with a compliance constant [Fig. 42; 4200] and a current output force [Fig. 42; 4208] (see Column 43, Line 62 - Column 44, Line 17).

Regarding claim 3, Delson discloses determining a closed-loop position-dependent force [Fig. 42; 4212] based at least in part on the raw sensor value (see Column 43, Line 62 - Column 44, Line 17).

Regarding claim 5, Delson discloses filtering the raw sensor value for overshoot sensor values occurring at limits to the range of motion of the manipulandum (see Column 46, Lines 19-47).

Regarding claim 6, Delson discloses calibrating the range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion based at least in part on the extent of motion of the manipulandum up to a designated time (see Column 46, Lines 19-47).

Regarding claim 7, Delson discloses normalizing the raw sensor value to a normalized range of motion, wherein the adjusted raw sensor value is further associated with the normalized raw sensor value (see Column 43, Lines 26-61).

Regarding claim 8, this claim is rejected by the reasoning applied in rejecting claim 1; furthermore, Delson discloses a device comprising: a linkage mechanism providing a degree of freedom to the manipulandum (see Column 2, Lines 52-59); and a processor (see Column 10, Lines 56-61).

Regarding claim 9, Delson discloses the linkage mechanism includes a chain of four rotatably-coupled members [Fig. 5A; 105 and 119] coupled to ground at each end of the chain (see Column 29, Lines 18-47).

Regarding claim 10, Delson discloses an actuator (see Column 1, Lines 5-12) coupled to the linkage mechanism, the actuator operative to output a force in the degree of freedom (see Column 2, Lines 52-59).

Regarding claim 12, Delson discloses the sensor comprises a relative digital encoder (see Column 35, Lines 48-54).

Regarding claim 13, Delson discloses the sensor is coupled to the actuator such that the sensor is operable to detect rotation of a shaft of the actuator (see Column 1, Lines 48-57).

Regarding claim 14, this claim is rejected by the reasoning applied in rejecting claim 6.

Regarding claim 15, this claim is rejected by the reasoning applied in rejecting claim 3.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Delson et al (US 6,002,184 A) in view of the instant application's admitted prior art.

Regarding claim 4, Delson does not expressly disclose using a belt drive. However, the instant application's admitted prior art does disclose transmitting forces from an actuator to a manipulandum with a belt drive (see Paragraph 5 in the Instant Specification). Delson and the instant application's admitted prior art are analogous art, because they are both from the shared field of force feedback interface device between humans and computers. Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention use the belt drive of the instant application's admitted prior art with Delson's raw sensor value adjustment method, so as provide a reduced cost transmission system having high fidelity motion and force output.

Regarding claim 11, this claim is rejected by the reasoning applied in rejecting claim 4.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicants are advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Response to Arguments

9. Applicants' arguments filed 21 December 2006 have been fully considered but they are not persuasive. The applicants contend the cited prior art of Delson et al (US 6,002,184 A) neglects teaching, "determining an adjusted raw sensor value based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum" (see Page 5 of the Response filed 21 December 2006). However, the examiner respectfully disagrees.

Delson discloses a method comprising: receiving a sensor signal [Fig. 42; output signal from sensor 4206 to adaptive controller 4202 at a first/initial time] comprising a raw sensor value [i.e. measurement of the mechanism output at a first/initial time] from a sensor [Fig. 42; 4206], the raw sensor value associated with a position of a manipulandum [Fig. 42; 4208] in a range of motion; determining an adjusted raw sensor value [i.e. measurement of the mechanism output at a later time, following signal correction due to a discrepancy between the desired and measured mechanism output] based at least in part on the raw sensor value [wherein sensor feedback is used for the adaptive component of control] and a compliance between the sensor and the manipulandum; and outputting an output signal [Fig. 42; output signal from sensor 4206 to adaptive controller 4202 at a later time, following signal correction due to a discrepancy between

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the desired and measured mechanism output] comprising the adjusted raw sensor value (see Column 43, Line 62 - Column 44, Line 17). Delson further states,

"A periodic signal generator 4200 produces a repeating pattern. The open loop control is implemented in a similar fashion to the method in FIG. 41, using a lookup table 4210, amplifiers 4212, and a mechanism 4208. The adaptive controller 4202 receives measurement of the mechanism output from sensors 4206, and also receives the desired mechanism output from the signal generator 4200. The adaptive controller 4202 provides a signal correction 4214, which is summed with the desired mechanism output signal at the summer 4216. Since the signals are repetitive, errors in the mechanism output that occur in one cycle will be repeated in the next if there is no correction. However, the adaptive controller can "anticipate: the upcoming error and compensate for them in advance. In this fashion, the error can be reduced in each cycle, until it is reduced to the level of random noise and variation in the system. This approach can automatically compensate for dynamics in the system, and disturbance forces that consistently occur in each cycle" (see Column 44, Lines 3-17).

By such reasoning, rejection of the claims is deemed necessary, proper, and thereby maintained at this time.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Piziali whose telephone number is (571) 272-7678. The examiner can normally be reached on Monday - Friday (6:30AM - 3PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (571) 272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jeff Piziali
2 March 2007